

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### Improvements in or relating to Tachographs and other Graphic Recording Devices

We, KIENZLE APPARATE G.M.B.H., a German body corporate, of Villigen/Schwarzwald, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to tachographs and other graphic recording devices.

A recording sheet of a tachograph is conventionally turned through one revolution in twenty-four hours and has recorded thereon such information as the speed of a vehicle, the number of stops the vehicle made etc. Since it is inconvenient to replace one recording sheet with another each twenty-four hours, it has been proposed to provide for the tachograph a plurality of recording sheets, the arrangement being such that after each twenty-four hours the recordings are completed on one sheet and are automatically made during the next twenty-four hours on the succeeding sheet. Thus, if seven sheets are inserted at one time into the tachograph it is only necessary to open the latter once a week. A structure of this latter type is disclosed in the Specification of Patent No. 723,193. This type of structure has been found to operate satisfactorily, and the present invention provides improvements on this type of structure. For example, the interconnection of the several sheets by adhesive strips as shown in the above patent has been found to be time-consuming and expensive. Moreover, a knife is provided for cutting the strips, and it has been found that this knife must be sharpened fairly frequently and has the possibility of injuring a person changing one set of sheets for another.

Thus, it is an object of the present invention to provide a plurality of sheets for use in a graphic recording device and capable of being connected together in a manner which does not require the use of adhesive strips or the like which must be cut.

According to the present invention we provide a graphic recording device, such as a tachograph or the like, having in combination record carrier means, driving means for said record carrier means, a plurality of superposed circular record sheets on said record carrier means, said record sheets having radial cuts in helically staggered relationship to each other and being each formed with a slit and a tab, the tab of one record sheet extending through the slit of another record sheet for interconnecting said record sheets for movement together, and separating means for successively separating the tab of one of said record sheets from the slit of the other record sheet during the movement of said plurality of record sheets.

Fig. 1 is a diagrammatic elevational view showing how the tachograph appears when it is opened;

Fig. 2 is an elevational view on an enlarged scale showing the interconnected sheets co-operating with a writing support and with the finger which separates the sheets;

Fig. 3 is a fragmentary sectional view taken along line III—III of Fig. 2 in the direction of the arrows;

Fig. 4 is a fragmentary elevational view illustrated partly in section and showing the tachograph structure connected directly to the sheets for turning the same, Fig. 4 also showing how the plurality of sheets are assembled into a unit;

Fig. 5 fragmentarily illustrates the relationship between a pair of superposed sheets; and

Fig. 6 is a perspective view of a removable knob and spring used for removing one set of sheets and for holding the next set in the tachograph.

Referring now to the drawings, Fig. 1 shows the tachograph housing 20 which is carried by the dashboard of a vehicle. Measuring devices are located within the housing 20 and are covered by the plate 25. These devices actuate writing instruments 21, 22, 23 which extend through the slot 24 of the plate 25.

[Price 3s. 6d.]

Price 4s 6d

The housing 20 is connected by a hinge 26 with the tachograph cover 1 shown in Fig. 1 in the open position. In order to close the tachograph the operator turns the cover 1 upwardly through 180° so as to place the co-operating parts of the lock 27 together, and with this lock the tachograph is releasably closed.

The cover 1 carries a clockwork which rotates a drive shaft 2 (Fig. 4) so as to turn the latter through one revolution each twenty-four hours. This shaft 2 forms part of a turning means for turning the recording sheets, and this turning means includes the sheet-carrying disc 3 fixed to the shaft 2 for rotation therewith. The turning means further includes a centre pin 4 coaxial with the shaft 2 and extending from the side of disc 3 opposite from the shaft 2, the pin 4 being fixed to disc 3 for rotation therewith.

The plurality of sheets 5 are respectively formed with central openings which are aligned and coaxial with each other and through which the pin 4 extends. These central openings 29 are visible in Fig. 5. At its face which is directed upwardly as viewed in Fig. 4 the disc 3 fixedly carries a plurality of pointed projections 29 distributed about the turning axis in the manner shown in Fig. 1. These pointed projections 29 engage the lowermost sheet 5, as viewed in Fig. 4, so as to provide a positive drive transmission from the disc 3 to the lowermost sheet 5 of Fig. 4.

The cover 1 forms a support means for the turning means which has been described in part above, and in addition this cover 1 forms a support means for supporting a writing support in the form of a plate 11 which is fixed to the cover 1 and which is shown in Figs. 1—3. This writing support 11 is located during operating of the tachograph at the side of the group of sheets opposite from the writing instruments 21—23 and forms a backing for the sheets at a part thereof extending beyond the disc 3 during inscribing of the sheets by the instruments 21—23 so that clear markings are produced. Screws 30 fix to the writing support 11 an arm 31 having a portion 32 overlying the support 11 and defining with the latter a space into which the sheets 5 extend.

A stop finger 13 is integral with and bent from the arm portion 32 and extends away from the space into which the sheets 5 extend for a purpose described below.

The arm portion 32 also has fixedly connected thereto a stepped springy lifting or separating finger 12 which extends laterally from the arm portion 32 in the manner shown most clearly in Figs. 1 and 2 and which has a free end portion located to the left of arm 31 as viewed in Figs. 1 and 2 pressing against the sheets 5. When there are no sheets in the tachograph this free end of finger 12 engages the support 11. It is apparent that the finger 12 could be connected directly to the support

means 1 but in the illustrated example is connected indirectly to the support means 1 through the arm 31 and the writing support 11. When a set of sheets are mounted in the open tachograph shown in Fig. 1 the finger 12 is moved away from the support 11 and the sheets are placed between elements 11 and 12 while the sheets are placed next to the disc 3 with the pin 4 extending through the openings 29.

The free end of the pin 4 distant from the disc 3 is formed with a bayonet slot and a pin 8 which is fixed to a hollow knob 9 and extends into the interior thereof cooperates with the bayonet slot for releasably fixing the knob 9 on the end of the pin 4, as shown in Fig. 4. As is apparent from Fig. 6 the knob 9 has an annular spring 10 fixed thereto, and this spring 10 has a pair of opposed portions bent away from the knob 9 and pressing against the set of sheets 5, as indicated in Fig. 4, when the knob 9 is mounted on the pin 4. It is apparent that the knob 9 and spring 10 are easily removed as a unit when it is desired to remove a set of sheets 5 and are easily replaced in the position of Fig. 4 when a new set of sheets 5 has been placed in the tachograph. The spring 10 presses the sheets against the projections 29 of the disc 3.

It is preferred to include seven sheets 5 in a set so that each sheet may record the operation of a vehicle during one day of a week. Each of the sheets 5 is formed with a sector-shaped cutout 15 as is shown in Fig. 5. The cutout 15 of each sheet extends radially from the outer periphery toward the axis thereof. When the plurality of sheets 5 are superposed to form a set, the cutouts 15 are helically staggered with respect to each other, as is indicated for two sheets in Fig. 5 where the cutout 15 of the upper sheet is shown in solid lines and the cutout 15 of the lower sheet is shown in dotted lines. The sheets turn in a counter-clockwise direction, as viewed in Fig. 5, and it will be noted that the leading edge of the cutout 15 of the upper sheet 5 is aligned with the trailing edge of the cutout 15 of the lower sheet 5 of Fig. 5. The sheet located on top of the uppermost sheet of Fig. 5 has its leading edge of its cutout 15 aligned with the trailing edge of the cutout 15 of the upper sheet 5 of Fig. 5, while the sheet located below the lower sheet of Fig. 5 has its trailing edge of its cutout 15 aligned with the leading edge of the cutout 15 of the lower sheet of Fig. 5. In this manner the cutouts of the several sheets are helically staggered about the common axis of the sheets. The lowermost sheet 5 as viewed in Figs. 2—4 is not provided with a cutout 15.

At the trailing edge 18 of its cutout 15 and adjacent its periphery each sheet is provided with a tab 16 extending outwardly toward the periphery of the sheet and making an acute angle with the edge 18, as is apparent from Fig. 5. Of course, the lowermost sheet of the set does not have such a tab. Also, each sheet

except the uppermost sheet of the set is formed with a slit 17 adjacent its periphery and the slit and tab of each sheet are angularly displaced with respect to each other by an angle equal to the angle included between the sides of the sector-shaped cutout 15 thereof, so that when the sheets are assembled with the tab of each sheet extending through the slit of the next lower sheet, as viewed in Figs. 2—5, the several cutouts will automatically be staggered properly with respect to each other in the manner described above. Because of the fact that the tabs 16 extend outwardly toward the periphery of the sheets respectively at acute angles with the edges 18, the sheets are interconnected for rotation together and the rotation of each sheet is transmitted to the next sheet not only by the frictional interengagement of the sheets but in addition positively by the co-operation of the tabs and slits.

In accordance with the present invention a sleeve 7 passes through the aligned openings 29<sup>1</sup> of the several sheets and this sleeve 7 has at its opposite ends a pair of outwardly extending annular flanges, respectively, each of which has a diameter greater than that of the openings 29<sup>1</sup>. The sleeve 7 is only provided with the lower flange shown in Fig. 4 when the sheets 5 are mounted thereon, and after such mounting of the sheets 5 the upper edge of this sleeve 7 is spread out to form the upper flange of the sleeve. In this way it is impossible for a sheet to be removed from the set without becoming deformed as by being torn, and thus unauthorized removal of a sheet may be detected. The sleeve 7 together with the sheet 5 is placed upon the pin 4 and then the knob 9 together with the spring 10 is mounted on the end of the pin 4 in the manner described above. An adhesive strip 34 is placed in engagement with the lower flange of sleeve 7 and with the lowermost sheet 5, as viewed in Fig. 4, so that through this strip the drive is transmitted from the lower sheet 5 of Fig. 4 to the sleeve 7 which thus rotates together with the lower sheet 5 of Fig. 4.

The above described structure operates as follows:—

After a new set of sheets 5 has been placed in the tachograph in the manner described above, the tachograph is closed and the writing instruments 21—23 engage the uppermost sheet of Fig. 4. After twenty-four hours this sheet is turned through one revolution. Precisely at the end of a twenty-four hour period the writing instruments come to the leading edge of the cutout 15 of the uppermost sheet of Fig. 4 and immediately start to inscribe the next lower sheet of Fig. 4 at the portion thereof accessible through the sheet which has just been inscribed. Just before this time, however, the free end of the finger 12 which is located in the path of movement of the cutout 15 automatically enters into this cutout and this finger is thin enough to have its free end auto-

matically inserted between two adjacent sheets so that as the leading edge of the cutout 15 approaches the writing instruments the trailing edge thereof rides over the finger 12 in the manner shown in Fig. 2, and due to the stepped construction of this finger the sheet is separated in the region of the trailing edge of this cutout 15 from the next adjacent sheet and the tab 16 of the sheet whose inscription is about to be or has been completed is gradually withdrawn from the slit 17 of the next adjacent sheet, as indicated in Fig. 2. The tabs move smoothly from the slits and no tearing takes place. Before the trailing edge 18 of the inscribed sheet reaches the stop 13 the tab of the latter sheet has been completely removed from the slit of the next sheet and the thus separated sheet continues to turn until the trailing edge 18 of its cutout 15 engages the stop 13. The latter stop finger stops the rotation of the inscribed sheet, and these operations are automatically repeated successively with each sheet so that the several sheets become successively aligned with their several trailing edges 18 engaging the stop 13. In this way the several cutouts 15 are aligned so that the writing instruments at all times have access through these aligned cutouts to the sheet which is being inscribed at any particular instant.

It is also possible to provide the tabs respectively at the leading edges of the cutouts of the sheets and with such an arrangement each tab would extend upwardly from a lower sheet as viewed in Fig. 2 into a slit of the next upper sheet so that each tab would extend to the next preceding rather than the next following sheet. With this arrangement the separating finger 12 would cooperate in the same way with the trailing edge of each cutout, and after this trailing edge engages the stop 13 the continued turning of the next following sheet would cause its tab to move out of the slit of the stopped sheet.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of graphic recording devices differing from the types described above.

While the invention has been illustrated and described as embodied in a tachograph and a set of recording sheets, it is not intended to be limited to the details shown, since various modifications and structural changes may be made within the scope of the claims.

WHAT WE CLAIM IS:—

1. Graphic recording device, such as a tachograph or the like, having in combination record carrier means, driving means for said record carrier means, a plurality of superposed circular record sheets on said record carrier means, said record sheets having radial cuts in helically staggered relationship to each other and being each formed with a slit and a tab, the tab of one record sheet extending through the

- slit of another record sheet for interconnecting said record sheets for movement together, and separating means for successively separating the tab of one of said record sheets from the slit of the other record sheet during the movement of said plurality of record sheets.
- 5 2. Graphic recording device as claimed in Claim 1, wherein said helically staggered cuts of the record sheets are cut-out portions having a leading edge and a trailing edge when being moved and wherein said tabs project beyond the trailing edge of said cut-out portion, while said slit is close to said leading edge of the cut-out portion.
- 10 3. Graphic recording device as claimed in Claim 1, wherein said tabs and said slits are close to the outer periphery of said record sheets.
- 15 4. Graphic recording device as claimed in Claims 1 and 2, wherein said tabs on the trailing edge of said record sheets extend outwardly towards the periphery of the record sheet and make an acute angle with said trailing edge.
- 20 5. Graphic recording device as claimed in Claims 1 and 2, wherein said separating means is connected to stopping means for stopping the record sheets after having been separated.
- 25 6. Graphic recording device substantially as described with reference to the accompanying drawings.
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Fig. 1

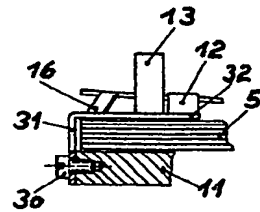
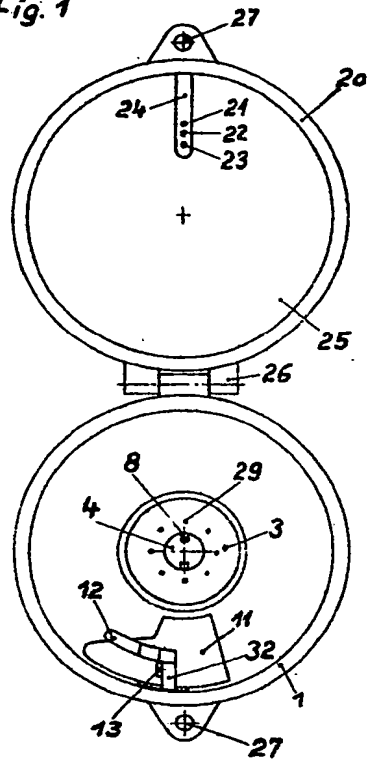


Fig. 3

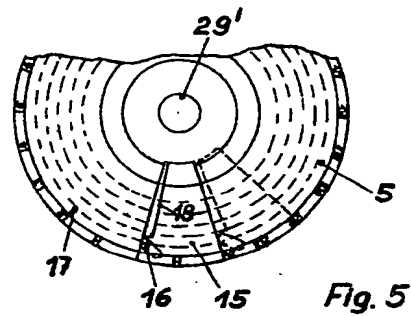


Fig. 5

Fig. 4

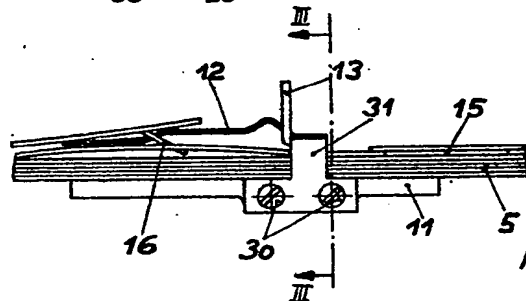
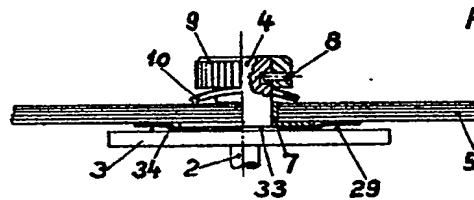


Fig. 2

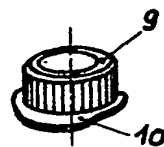


Fig. 6

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